



If $y = \frac{2x+1}{x}$, use the definition of a derivative to determine y' .

$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$\lim_{h \rightarrow 0} \left[\frac{2(x+h)+1}{x+h} - \frac{2x+1}{x} \right] \frac{1}{h}$$

$$\lim_{h \rightarrow 0} \left[\left(\frac{2x+2h+1}{x+h} \right) \frac{x}{x} - \left(\frac{2x+1}{x} \right) \frac{(x+h)}{x+h} \right] \frac{1}{h}$$

$$\lim_{h \rightarrow 0} \left[\frac{\cancel{2x^2} + \cancel{2xh} + \cancel{x} - (\cancel{2x^2} + \cancel{2xh} + \cancel{x+h})}{x(x+h)} \right] \frac{1}{h}$$

$$\lim_{h \rightarrow 0} \left(\frac{-h}{x(x+h)} \right) \frac{1}{h}$$

$$\lim_{h \rightarrow 0} \frac{-1}{x(x+h)}$$

$$f'(x) = -\frac{1}{x^2}$$

Calculus 120

Unit 1: Rate of Change and Derivatives

February 12, 2019: Day #8

1. Quiz on Wednesday - Derivatives

2. Assignment Due Friday

3. Page 105-106

#1, 3, 7, 9, 10, 11, 12, 17, 18, 19

Curriculum Outcomes

C1. Explore the concepts of average and instantaneous rate of change.

Graphing the Derivative Function

The graph of the derivative function provides very useful information about the function itself.

Investigation: Graph $f(x) = x^2 - 2x + 8$ and its derivative from $x = -4$ to $x = 5$ on Graphmatica

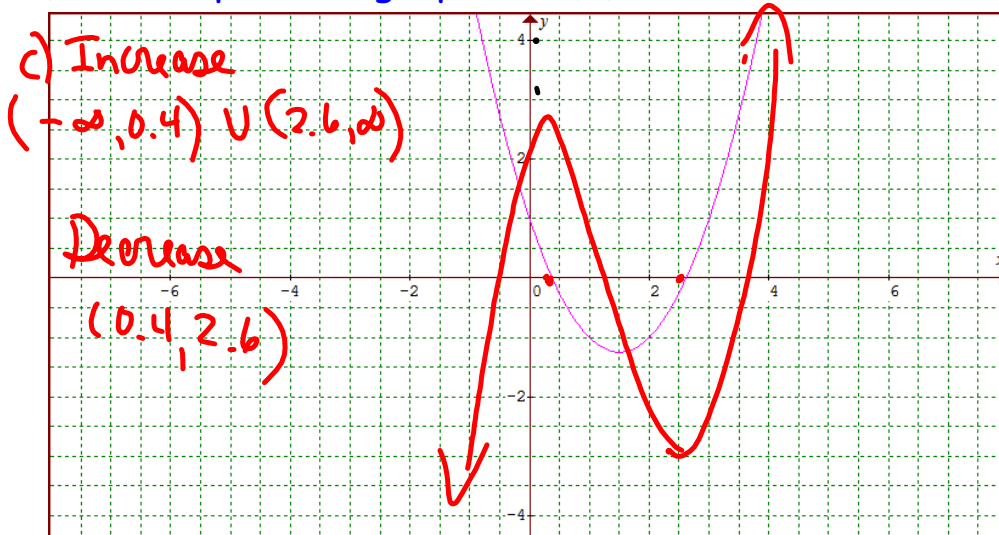
What does the graph of the derivative tell you about the actual function?

Examine a couple of more functions and their derivatives (Try a cubic, quartic, etc...)

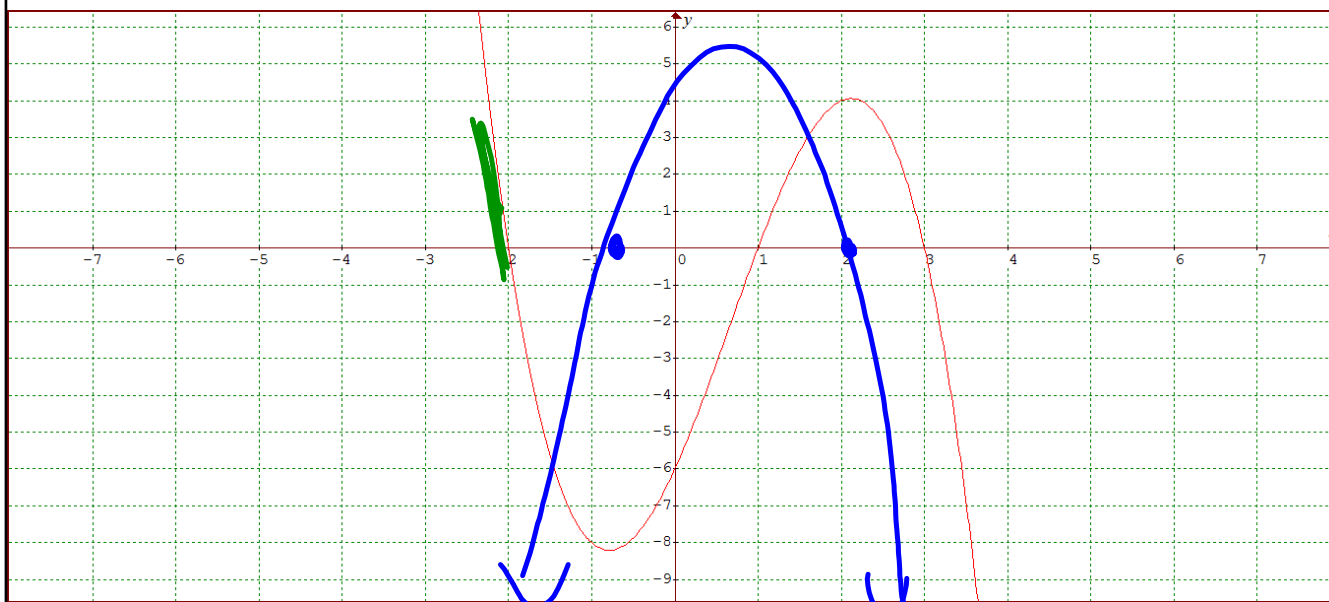
- 1. The local maximum and minimum points of the function correspond to the x-intercepts on the derivative function.**
- 2. The derivative of a polynomial function is one degree less than the polynomial function itself.**
- 3. The intervals of increase of a function correspond to intervals where the graph is above the x-axis on the derivative function. Similarly, intervals of decrease of a function correspond to where the graph is below the x-axis on the derivative function.**

The derivative, $F'(x)$ of a function is shown below:

- What type of function is $f(x)$? *Cubic*
- At what x -values are the local maximum and or minimum points of $f(x)$ located? $x = 0.4$ (max) $x = 2.6$ (min)
- What are the intervals of increase and decrease of $f(x)$?
- Draw a possible graph of $f(x)$.



A function is shown below. Sketch a possible graph for its derivative.

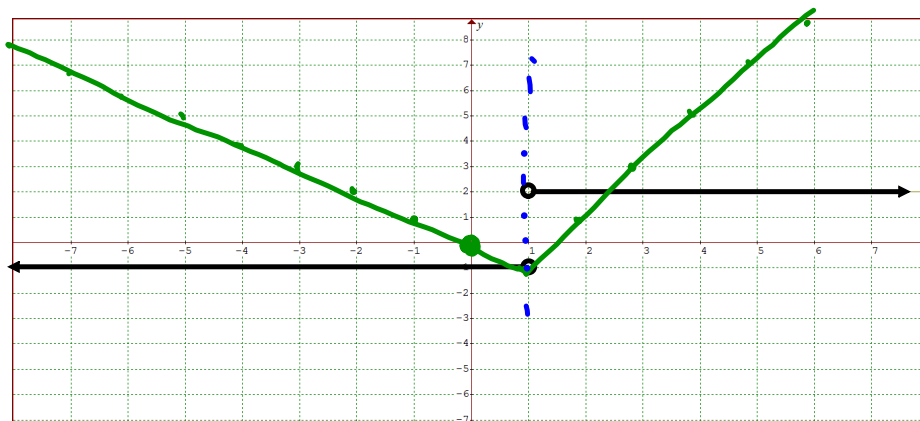


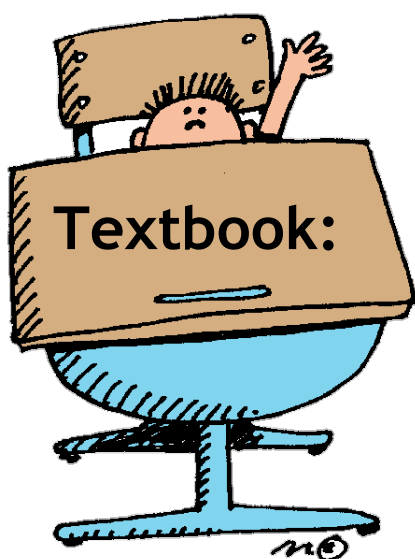
Sketch the graph of a function that has the following properties:

i) $f(0)=0$ $(0,0)$

ii) the graph of f' , the derivative of f , is shown below

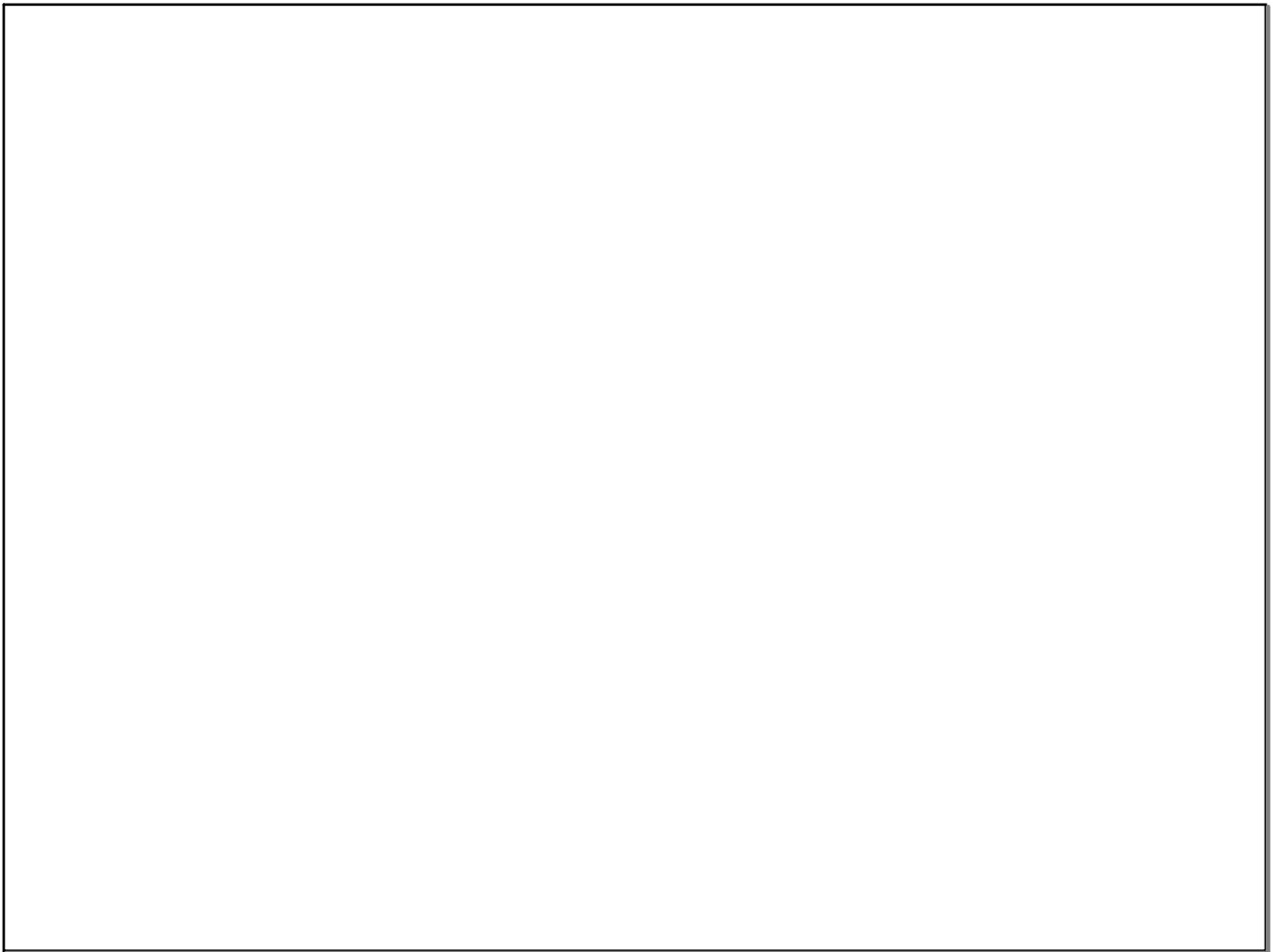
iii) f is continuous for all x .





Practice

🕷️ Page 105-106
#13, 14, 15, 16, 21, 22,
26a



Attachments

2.1_74_AP.html



2.1_74_AP.swf



2.1_74_AP.html